

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF SOILS—MILTON WHITNEY, Chief.

SOIL SURVEY OF DREW COUNTY, ARKANSAS.

BY

B. W. TILLMAN, IN CHARGE, F. A. HAYES, AND
F. Z. HUTTON.

HUGH H. BENNETT, INSPECTOR, SOUTHERN DIVISION.

[Advance Sheets—Field Operations of the Bureau of Soils, 1917.]



WASHINGTON:
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1919.

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LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,

BUREAU OF SOILS,

Washington, D. C., December 4, 1918.

SIR: I have the honor to transmit herewith the manuscript report and map covering the survey of Drew County, Arkansas, and to recommend that they be published as advance sheets of Field Operations of the Bureau of Soils, 1917, as authorized by law.

Respectfully,

MILTON WHITNEY,

Chief of Bureau.

HON. D. F. HOUSTON,

Secretary of Agriculture.

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MAP.

Soil map, Drew County sheet, Arkansas.

SOIL SURVEY OF DREW COUNTY, ARKANSAS.

By B. W. TILLMAN, In Charge, F. A. HAYES, and F. Z. HUTTON.—Area
Inspected by HUGH H. BENNETT.

DESCRIPTION OF THE AREA.

Drew County, Ark., is in the southeastern part of the State, about 18 miles west of the Mississippi River and 27 miles north of Louisiana. It is approximately rectangular, and measures about 27 miles from north to south and 30 miles from east to west. It has a total area of 847 square miles, or 542,080 acres.

The county comprises three main topographic divisions: The rolling upland, the flatwoods upland, and the stream flood plains, or first bottoms.

The rolling upland belt forms the divide between the main eastern and western drainage systems. This belt crosses the county in a general north-south direction through Monticello. It varies in width from 6 to 12 miles, the more extensive areas lying north of Monticello, and is the highest part of the county, averaging about 200 feet above sea level. The slopes usually are rather steep, and the surface drainage is thorough and in some places excessive.

The flatwoods upland lies east of this rolling belt. It consists of a broad, flat area bordering the first bottoms of Bayou Bartholomew in the eastern part of the county, with small areas of similar country occurring irregularly in other parts. The surface drainage and underdrainage are deficient. The slopes to the first bottoms usually are sharp, with a drop of 10 to 15 feet. This region is known locally as the "flatwoods." It is 25 to 40 feet lower in elevation than the rolling upland.

The stream bottoms constitute an important part of Drew County, comprising about two-fifths of its total area. The principal area is a nearly level plain bordering Bayou Bartholomew, with narrow strips reaching far out into the uplands along the smaller streams

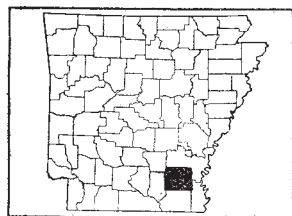


FIG. 1.—Sketch map showing location of the Drew County area, Arkansas.

and along Saline River in the western part of the county. The bottoms include flat, poorly drained areas known as "brakes" and "swamps," with low ridges and hummocks which have better drainage. The lower lying areas along Bayou Bartholomew are subject to occasional overflow by backwater from the Mississippi River. The bottoms along Saline River and the small streams are subject to frequent overflows. Levees along the Mississippi River protect the bottom land of that stream from floods.

The elevation of the stream bottoms in the eastern part of the county, according to levels run by the St. Louis, Iron Mountain & Southern Railroad, varies from 140 to 150 feet. The total range in elevation in the county is probably not over 90 feet.

The small streams east of the divide flow in a general southeasterly direction into Bayou Bartholomew; those west of the divide flow southwestward, into Saline River. Bayou Bartholomew occupies a deep channel, bordered by broad, flat bottoms containing numerous "slashes" and "sloughs." It enters the county west of Winchester and flows in a general southerly direction into Ashley County. Saline River forms the county boundary from a point 7 miles southwest of Wilmar to the southern boundary line.

Next to these main drainage ways, the largest streams are Cutoff Creek, in the central part of the county, and Hudgins Creek, in the western part. These streams flow southward, and have numerous small tributaries which ramify all parts of the upland.

In general, the streams of the county have low gradients and their currents are swift only during high-water stages, so that their degrading action is slow. The flood plains prevailingly are wide. The streams follow very meandering courses, usually near the center of the valleys. Many of them are intermittent. The drainage in much of the bottoms is poorly established.

The uplands, with the exception of a few prairie areas, originally were forested with several varieties of oak, hickory, gum, and pine. Although most of this growth has been removed, quite extensive areas of merchantable timber remain. The pine growth is most prominent in the southwestern section, although considerable pine also is distributed through the southeastern part. It is estimated that about 35 per cent of the rolling upland is in cultivation, as compared to only about 15 per cent of the flatwoods upland.

The native timber of the bottoms consists of white, black, post, and overcup oak, hickory, elm, gum, pecan, hackberry, and cypress. Most of the well-drained bottom land has been cleared, but there are still large tracts of the original timber in heavy, poorly drained areas. It is estimated that about 60 per cent of the bottom land is in cultivation.

The first settlement in Drew County was made in the neighborhood of Monticello about 1839. The county was organized in 1846 from part of Bradley County. Monticello, the county seat, has always been the principal town and is the main distributing center of the county. Its population is reported in the 1910 census as 2,274, but is now estimated as approximately 4,000. Monticello has a cotton-seed-oil mill with a capacity of 21,900 tons of seed annually, a stave mill, cotton factory, and other industrial establishments. Wilmar, which has important lumber interests, is the next largest town. Its population in 1910 is reported as 929. A number of smaller towns are distributed throughout the county.

The population of Drew County is given by the 1910 census as 21,960, all of which is classed as rural and averages 25.9 persons per square mile. A large proportion of the white farmers have immigrated from Southern States, mainly Mississippi, Tennessee, Kentucky, North and South Carolina, and Georgia. The population is more evenly distributed through the bottomlands than over the uplands, much of which is sparsely settled. About 50 per cent of the population consists of negroes. There are a few settlements in the upland in which the population is mainly white.

The southern part of the county has good railroad facilities, but the northern part is without railroads except for a line of the St. Louis, Iron Mountain & Southern which crosses the northeastern corner. Steamboat traffic was important at one time, but all shipments are now by rail.

A few of the wagon roads leading out of Monticello are graveled and well graded for distances of 7 to 8 miles. Most of the other roads are poor, many being almost impassable in rainy seasons. In dry seasons all the roads usually are in fair condition. Little systematic road grading is done. The bridges, as a rule, are poorly constructed. Roads in the flatwoods are easily kept in good condition. The soils have a tendency to pack, and good dirt roads can be constructed by grading and the subsequent use of a road drag.

CLIMATE.

The climate of Drew County is typical of the central part of the Gulf Coastal Plain. There is no Weather Bureau station in the county, but the figures in the following table, compiled from the records of the station at Warren, Bradley County, are representative of the general climatic conditions in Drew County:

*Normal monthly, seasonal, and annual temperature and precipitation at
Warren, Bradley County.*

[Elevation 304 feet.]

Month.	Temperature.			Precipitation.		
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year (1915).	Total amount for the wettest year (1905).
	° F.	° F.	° F.	Inches.	Inches.	Inches.
December.....	44.7	81	7	5.21	2.75	6.67
January.....	43.4	82	7	5.01	5.32	6.51
February.....	43.4	83	—10	4.44	4.60	3.43
Winter.....	43.8	83	—10	14.66	12.67	16.61
March.....	55.4	95	21	6.32	3.60	10.80
April.....	62.3	93	28	5.00	1.25	10.79
May.....	71.7	100	34	4.33	2.50	6.57
Spring.....	63.1	100	21	15.65	7.35	28.16
June.....	78.4	106	47	4.33	4.95	7.20
July.....	81.9	108	53	3.81	2.85	9.02
August.....	81.7	109	52	2.98	4.65	5.99
Summer.....	82.7	109	47	11.12	12.45	22.21
September.....	75.6	105	40	3.44	2.60	6.07
October.....	64.2	96	25	3.64	2.40	5.28
November.....	53.4	87	12	3.79	4.85	3.54
Fall.....	64.4	105	12	10.87	9.85	14.89
Year.....	63.0	109	—10	52.30	42.32	81.87

The climate is free from the extremes of temperature that are characteristic of States farther north. The mercury rarely falls to 10° F. and seldom rises above 100°. Periods of very cold weather are exceptional and of short duration. The winter is short, and the ground rarely freezes to a depth of more than a few inches. Snow-fall seldom exceeds a few inches in depth and the snow soon melts.

The precipitation is adequate for agriculture. More than one-half the rainfall occurs in the winter and spring months. The winter and spring rains occur as cold, steady downpours, sometimes lasting two or three days. As a result of these heavy rains small streams frequently overflow, causing damage to farm crops and to the cultivated fields. The rainfall is lighter during the growing season, but crops rarely suffer from drought where proper cultural methods are practiced.

The average date of the last killing frost in the spring is March 30 and of the first in the fall November 2, giving a normal growing season of 217 days. The date of the latest recorded killing frost in spring is April 26, and that of the earliest in the fall, October 11.

AGRICULTURE.

The permanent settlement of Drew County began about 1840. The country was then covered with heavy forests, in which the early settlers cleared small areas. These were used for growing corn, vegetables, and cotton. At the beginning of the Civil War considerable agricultural progress had been made. Plantations of several hundred acres were cleared in different parts of the county, notably along Bayou Bartholomew and in the vicinity of Saline River, these streams affording the only means of transportation. Cotton, the production of which was important from the beginning, by 1860 had become the main money crop. It was shipped by boat down the small streams to the Mississippi River and thence to New Orleans.

Agriculture was demoralized by the Civil War; land values reached a low level, labor conditions were upset, and much of the land was thrown out of cultivation. On some of the old plantations farming has never been resumed. Renewed interest in agriculture began about 1870. The 1880 census reports 50.9 per cent of the area of the county in farms, and 21.9 per cent of the farm land improved. The population gradually increased, new settlers coming mainly from the older southern States. Agricultural progress, though slow, has been continuous. In the 1910 census 55.9 per cent of the land is reported in farms, and 42.4 per cent of the farm land improved.

The extensive forests of Drew County have retarded to some extent its agricultural progress. Lumbering is still important, but it is estimated that at the present rate of consumption the available supply of merchantable timber will be largely exhausted in about 10 years, so that the permanent prosperity of the county will depend upon the development of agriculture.

Cotton continues the main money crop of the county, notwithstanding the recent advent of the boll weevil. The acreage in cotton in 1909 was 38,698 acres, as compared with 21,796 acres in 1879. There was a decrease, however, from the 42,249 acres reported in 1899. Cotton is grown under the one-crop system, and some of the soil has apparently become less productive as a result of long use without sufficient rotation of crops or maintenance of the supply of organic matter. There is practically no rotation of crops other than an occasional change from cotton to corn, and the growing of an occasional crop of cowpeas with corn. In the uplands some farms have been abandoned after a long period of cropping. Some of the land has been continuously planted to cotton for 15 years or more.

Cotton is grown largely to the exclusion of subsistence crops, making it necessary to import large quantities of food supplies. Considerable stock feed also is shipped in. The census of 1910 reports a total expenditure of \$73,818 in 1909 for feed on 1,277 farms. How-

ever, there is at present a growing tendency to increase the acreage in corn, oats, vegetables, and hay in order to supply the local demand.

In the growing of cotton little attention is given by most farmers to the selection of good seed or of varieties adapted to the various soils. According to tests by the county agent, the Cleveland variety is best suited to the upland soils, and it has given almost as good yields on bottom lands as the Express, a high-yielding variety grown on the bottom lands. The Wanamaker Cleveland, a strain of the Cleveland, is also a popular and valuable variety on bottom-land soils, mainly the Portland very fine sandy loam and the Ochlockonee silt loam. Of the short staple, little of which is now grown, the King is the most popular variety. The Triumph is another popular variety.

Cotton usually is planted the latter part of March or in April. It is grown on beds about 40 inches apart and is given shallow cultivation with light implements and hand hoes. In general the methods of cultivation are very well suited to the requirements of the crop. The boll weevil was unusually destructive in 1916, the yield in many cases being reduced 25 to 50 per cent. A general effort is made by the farmers to hasten the maturity of the crop, but little attention is given to crop rotation as a means of combating the weevil.

Next to cotton, corn is the most important crop. From 1880, when a total of 20,005 acres in corn was reported, to 1890 the acreage remained about the same, but from 1890 to 1900 there was an increase to 31,878 acres. During the last few years the acreage in corn has increased, owing to the difficulty of growing cotton and to the demand for feed for stock. However, large quantities of corn, as well as hay and oats, are still shipped into the county. All the corn produced is fed to work stock.

There are usually two general plantings of corn. The early planting usually is made in March and matures in late summer; the late corn is planted the latter part of April or in May. Little attention is given to the selection of seed. Of the white variety, Mosby's Prolific is most extensively grown where any effort is made to use improved strains. It appears to be adapted to local soil and climatic conditions. Native varieties without any particular breeding occupy a large acreage, and some Reid's Yellow Dent and Hickory King are grown.

The estimated average yield of corn for the county is about 20 bushels per acre. As much as 50 to 60 bushels on the bottom land and 35 or 40 bushels on the upland are frequently obtained. The seed bed for corn frequently is put in only fair condition of tilth, the chief interest of the farmer being centered in cotton, preparation for which ordinarily is more thorough. Very little land is "flat broken," and fall plowing is not practiced to any appreciable extent. Usually

corn is harvested by snapping the ears and leaving the stalks in the field to be winter pastured, a practice under which the soils frequently are puddled. In some cases cowpeas, velvet beans, or peanuts are drilled in the rows of corn at the last cultivation, or rows of these crops may be alternated with the corn. The grain usually is harvested, leaving the other crops to be pastured.

Some corn has been grown for ensilage in the last few years. A mixture of soy beans and corn and, a few miles south of Monticello, *feterita* has also been used with good results. Corn yields about 10 tons of ensilage per acre on upland soils of the Susquehanna and Caddo series. Most of the silos are on upland farms. There are about 20 in the county.

The 1910 census reports 1,290 acres in oats. The demand for oats has steadily increased as more live stock is kept, and large quantities are shipped in from northern points. The soils and climatic conditions are well suited to oats, and yields of 50 to 65 bushels per acre have been obtained with proper cultural methods. On the other hand, many failures are reported. Poor yields are attributed in many instances to an unfavorable soil condition brought about by previous clean cultivation and shallow plowing without adequate provision for maintaining the organic-matter supply. In a few cases oats are being introduced in crop rotations. Winter oats are most successful. The Turf and Texas Rustproof seem to be well suited to local conditions, the former being popular on well-drained soils, where the danger of damage by rust is not so great as on poorly drained soils.

The need of more organic matter in the soils is increasingly appreciated, and is resulting in the introduction of such crops as cowpeas, velvet beans, and soy beans. According to reports by farmers to the county demonstration agent, the area in velvet beans the present season (1917) will reach a total of 3,000 acres. This crop was very successfully grown on a smaller scale the last few years. It is usually planted with corn about the same time as cotton. Yields of corn following a crop of beans have increased as much as 10 to 12 bushels per acre. Similar results are obtained from the use of cowpeas and soy beans, and the acreage of these crops is steadily increasing. Both are valuable as soil improvers. Cowpeas commonly are cut for hay, whereas soy beans are more extensively used for ensilage in conjunction with corn. The manufacture of oil from soy beans has been undertaken by a local cottonseed-oil mill. In general, soils that have grown corn successfully give good results with cowpeas and soy beans. The latter crop seems to do better on poorly drained soils, and also seems to withstand dry weather better than cowpeas. It may be sowed at any time after danger from frosts is past, from early spring until midsummer. The crop can be grown

in many systems of rotation, and aside from its value as feed and for oil the production of the seed is profitable.

Rice is not grown, despite the fact that much of the upland, including the Crowley silt loam, the Lufkin silt loam, and practically all the Caddo silt loam, are similar to the important rice soils of Louisiana and central Arkansas, where the crop has proved highly successful. The prairie soil, or Crowley silt loam, flat phase, is particularly well suited to rice culture, as no expense for clearing is necessary.

The 1910 census reports 4,684 tons of hay cut in 1909. Most of the hay consists of wild or prairie grasses, 2,725 acres of wild hay being cut as against 624 acres in tame or cultivated grasses. The hay is stacked in the field, baled and sold locally, or fed on the farms as needed. Little hay is shipped out of the county. Prairie hay is not held in very high esteem by some feeders. The prevailing price is about \$8 a ton.

Alfalfa is grown on a few acres. It is not well adapted to the upland soils, but may be very successfully grown on the Portland very fine sandy loam of the bottoms. Lespedeza, or Japan clover, is a good hay crop, but is not extensively grown. It spreads over abandoned fields in a short time and grows wild along the roads. On the bottom soils it makes a luxuriant growth, yielding as much as 2 tons of hay per acre. It makes a very nutritious feed and is held in high esteem by feeders. When it is to be sowed in the spring best results are said to be obtained with a nurse crop, such as oats. On bottom land two cuttings are usually made, one in September and one in October. The hay is sold locally, the price in 1917 being about \$17.50 a ton. Lespedeza succeeds on all the soils of the county and can be used successfully in crop rotations. Where the crop is plowed under and the land planted to corn the following spring, the yield of the latter is greatly increased, and even where the entire growth is not turned under succeeding crops are benefited.

Sudan grass has been successfully grown in a small way for about two years. The hay is held in high esteem by feeders. Three cuttings are obtained, with a total yield of 4 to 6 tons per acre under favorable conditions. The crop ordinarily is harvested with a mower. It cures readily, and may be cut with a binder and allowed to cure in shocks. Sudan grass is valuable for growing in mixtures with cowpeas or soy beans. Bur clover is grown on a few farms. This crop is grown extensively for winter pasture in other areas having somewhat similar soils. It is easily started and succeeds on a wide variety of soils. With increased attention to live-stock production it should prove a valuable crop.

With the development of the live-stock industry, permanent pasture becomes more necessary. Bermuda grass seems to be the best avail-

able grass for summer pasture. It is very tenacious, withstands long periods of drought or excessive moisture, is not hurt by the trampling of live-stock, and furnishes nutritious hay and pasturage. Many farmers are reluctant to introduce this grass because they fear it can not be eradicated when the field is to be used for cultivated crops, but experience has shown that it can be killed by sowing oats and vetch in the fall and following with cowpeas the next summer. Johnson grass and nut grasses are becoming a pest in some parts of the county. Broom sedge grows voluntarily in clearings on both bottom and upland soil, and is sometimes cut for hay in earlier stages of growth. Broom sedge fields usually are burned over in the winter in order to improve the spring pastures. Water-loving grasses grow in the low, moist situations and furnish good pasturage. Wild cane grows in the Bayou Bartholomew bottoms on very poorly drained soils. This plant furnishes good winter pasturage.

Wheat has never been an important crop in Drew County, though it was grown more extensively between 1880 and 1890 than at present. Small acreages of rye, barley, and buckwheat have been grown, but these crops receive little or no attention at the present time. The efforts toward crop diversification are now directed to the leguminous crops, resulting in increased yields of corn and oats, the two cereals of greatest importance.

Irish potatoes are reported by the census of 1910 on 320 acres, with a production of 23,465 bushels. Practically all the crop is consumed locally. The Triumph is the leading early variety. Early potatoes are planted late in February or early in March, and are ready for market in June. A late crop, maturing in the fall, may be planted in June. Commercial success with potatoes apparently depends mainly upon the securing of markets, as all the sandy soils, which are of wide extent, are well suited to the crop.

Sweet potatoes are reported in 1910 on 583 acres, with a production of 44,779 bushels. Yields range from 125 to 200 bushels per acre. The Nancy Hall is the leading variety. The surplus over that needed for home use is sold at local markets. The sandy soils of both the uplands and the bottoms are well suited to this crop, and its commercial production apparently offers good opportunities.

Sugar cane and sorghum are grown on a small acreage for the manufacture of sirup. The greater part of the sirup is consumed at home, the remainder being sold on local markets.

Peanuts are grown on a very small acreage. In other areas with similar soils peanuts have proved valuable as a pasturage crop for hogs. They are grown profitably in Virginia, Texas, and elsewhere for the nuts, the oil, and the meal. The crop is planted in April or May, either alone or between corn rows.

According to the 1910 census, there are about 8,500 apple trees and 77,000 peach trees in the county. The production of orchard fruits increased rapidly from 1890 to 1900, but since that time it has declined considerably. It is probable that the decline is partly due to the ravages of fungous and insect diseases, which are much more serious than formerly, no methods of control being practiced. Elberta peaches of good flavor and quality are produced on the Orangeburg and Ruston fine sandy loams, and peach growing offers good commercial possibilities with proper orchard management. The crop is seldom injured by late freezes. Wild plum trees are numerous in old clearings. Plums succeed on all the upland soils, but the trees do best on the high-lying Orangeburg fine sandy loam and Ruston soils, which may be regarded as the best fruit soils of Drew County. Apples apparently do not do so well as they did formerly. Pears suffer severely from blight. That local conditions are particularly favorable for the production of certain fruits is indicated by the fact that the first prize for pears at the San Francisco Exposition was awarded to an exhibit from Drew County, the pears being produced where no control measures for insects or diseases were practiced. Peaches and plums do better under average conditions than either pears or apples.

Pecans are not extensively grown, although well suited to the soil and climatic conditions. Blackberries and strawberries do well, but receive little attention. Wild blackberries are abundant on all cleared land. The census of 1910 reports less than 1,000 grapevines in the county.

Animal industries have continued of secondary importance in agriculture, notwithstanding the very favorable climatic conditions and the abundance of nutritious grasses and forage crops. The presence of the Texas-fever tick has restricted the raising of cattle in large numbers, as well as the improvement of the grade, but this pest is being brought under control.

According to the census, 1,086 calves, 8,072 other cattle, 12,232 hogs, and 581 sheep and goats were sold or slaughtered in 1909. The census reports 7,350 dairy cows on farms in that year. There is a popular opinion in some parts of the county that improved live stock from northern States can not be introduced successfully on account of the difference in climatic conditions. The disastrous results that have followed such importations, however, have invariably been due to tick fever, and where animals are protected from the fever and have proper care they do as well as in the northern States. The live stock, especially cattle, is generally of inferior quality. The better dairy animals are mainly Jersey grades. There are some pure-bred bulls in the county, and some herds contain a few pure-bred

cows. A number of pure-bred bulls of beef breeds have been imported in the last year. There is no systematic feeding of cattle for market. There are no community creameries in the county. On a few farms dairying is the main industry, but no records of milk and butter-fat production are kept. Although the local demand for milk and butter is supplied, no dairy products are shipped to outside markets. Improvement in the breed of dairy cows and the more extensive production of feed at home are necessary for the extension of the dairy industry. Dairying offers good opportunities in the county.

The hogs usually are of fairly good grade. Duroc Jersey and Poland China blood predominates, with Hampshire of less prominence. Hog raising has been retarded by the prevalence of cholera, many animals being lost annually through this disease. Control is particularly difficult on account of the lack of stock laws and, in some parts of the area, the prevailing method of turning out the hogs to subsist on mast. Stock handled in this way occasionally is fed small quantities of corn. The range hogs are rounded up annually and those in good condition are either slaughtered or sold. When sufficient winter mast is available, large numbers of fat hogs are sold without other feeding. In seasons when the mast fails a large number of hogs perish from want of food. The primitive methods retard the development of hog raising, for which the soils, crops, and climatic conditions are particularly favorable.

Among the work stock the horses ordinarily are small. The mules generally are larger and of better quality, and on some of the larger plantations mules of large size and good quality are used. The mules are mainly imported from Missouri, Kansas, and northern States, though a few mules are raised locally. The census reports 431 horses and mules sold in 1909.

There are very few sheep in the county, but a considerable number of goats. Poultry is kept on all the farms and constitutes an important source of income. There is a good local demand for poultry products, but there are no specialized poultry farms.

The following table gives the values of the different classes of products in Drew County as reported in the census of 1910:

Value of farm products, by classes.

Cereals.....	\$342, 380
Other grains and seeds.....	8, 529
Hay and forage.....	39, 881
Vegetables.....	115, 884
Fruits and nuts.....	36, 883
All other crops (mainly cotton).....	969, 674

Live stock and products:

Animals sold or slaughtered.....	\$239, 846
Dairy products, excluding home use.....	102, 778
Poultry and eggs.....	76, 593
Wool, mohair, and goat hair.....	307
Total value.....	1, 932, 755

The adaptation of the different soils to certain crops is not generally recognized or followed. Cotton and corn are grown indiscriminately on most of the soil types. Crop rotation generally is not practiced, but its value in soil improvement is gaining recognition. Little fall plowing is done, even where there is very little danger of erosion, and winter cover crops are not grown. Plowing is shallow on both light and heavy soils. In general, the importance of proper cultural methods and use of fertilizers is little appreciated. Manure is not carefully preserved and is indifferently applied to the land. It is usually spread on the cotton crop in the spring. Frequently the manure is allowed to lie exposed in barn lots, where it leaches badly. The plowing under of green crops is rare, and the incorporation of organic matter, particularly by growing leguminous crops, receives practically no attention.

However, the use of commercial fertilizers is increasing. The census of 1910 reports a total expenditure of \$15,360 for fertilizer on 684 farms. The ordinary application consists of about 200 pounds per acre of a mixture containing 8 per cent phosphoric acid, 2 per cent nitrogen, and 2 per cent potash. Fertilizers are more extensively used on the upland than on the stream bottom soils.

Farm improvements in Drew County, with few exceptions, do not convey an accurate impression of the degree of prosperity of the farmers, largely because of the high percentage of nonresident owners, many of whom live in the towns. Few of the farm houses of the tenants are painted, and most of them are cheaply constructed. The farm machinery, although light, usually is in good repair and efficient of its kind. Two-horse implements are exceptional. The work stock for the county as a whole is light.

Farm labor is abundant. Probably about 85 per cent of the laborers are negroes. Wages range from \$10 to \$20 a month, with board and lodging. Day wages range from 50 cents to \$1.50, with board, depending on the season. An expenditure of \$101,939 for farm labor is reported by the 1910 census, on a total of 1,106 farms.

The average size of the farms is reported in 1910 as 86.2 acres, each tenancy being classed as a farm. Many of the plantations are parceled out among 15 or 20 tenants. An average of 36.6 acres per farm is reported improved. The total number of farms is given as 3,515.

The present selling value of the bottom land ranges from \$25 to \$75 an acre, depending on location, drainage, and improvements. Much of the upland can be bought for \$10 to \$12 an acre, although a few sales of well-located land have been made for as much as \$40 an acre. The flatwoods upland, comprising the Caddo and Lufkin soils, is cheapest. A large part of the bottom land is not for sale. The value of all farm property per farm is reported in the 1910 census as \$1,604, of which the land constitutes 58.6 per cent, buildings 16.8 per cent, implements 4.1 per cent, and animals 20.6 per cent.

The 1910 census reports 42.2 per cent of the farms operated by owners. Most of the land is farmed by tenants, and their methods differ but little from those that have prevailed for many years. The proportion of farms operated by owners is much lower in the bottoms than in the upland, most of the large plantations being in the bottoms. Share renting is the prevailing system, although some land is rented for cash. It is customary for the owner to furnish the equipment and in some cases the work stock. Where the owner furnishes seed, team, and tools, he usually receives one-half of the crops. Where the tenant furnishes the equipment the owner usually receives one-third of the corn and one-fourth of the cotton. The cost of fertilizers is borne in proportion to the share of the crop each receives.

SOILS.

The upland soils of Drew County consist of weathered deposits of the Coastal Plain, which are believed to be marine sediments. It is not definitely ascertainable whether all the parent material was laid down in the sea and subsequently uplifted, or whether the flatwoods part of the upland is an old terrace of fluvatile nature. Being lower than the rolling uplands belt and higher than the first bottoms, it has a terracelike position.

The bottom-land soils, covering about one-fourth of the county, are derived from recently deposited alluvium, consisting of wash from the various soils within the drainage basins of the streams. The alluvium of the Bayou Bartholomew bottoms contains enough material brought down by the Arkansas River from the Red Beds region of western Oklahoma to give the subsoil, and in places the surface soil, a brownish-red to pinkish color. There is no Red Beds material along the smaller streams. The alluvium here has been washed from the local upland soils, and the color is brown to grayish and mottled.

The flatwoods soils are very silty. On the other hand, the rolling upland soils have heavy clay subsoils over large areas, and in addi-

tion contain considerable chert and quartz, gravel, and sand, which possibly came from the Ozark region. In many places the underlying strata alternate, so that a stiff, plastic clay, for example, may not extend to very great depths before sandy clay or a gravelly stratum is encountered. Weathering processes have caused important changes in the original material, but not to the extent of destroying the lithologic relation between the soil and the immediately underlying material. One of the main effects is that of oxidation on the color of the soil. For example, soils in depressions and poorly drained flats, where oxidation processes have been retarded, have a gray or mottled gray and yellow color, whereas soils that are better drained, because of more favorable topographic position or subsoil structure, have a yellowish to reddish color.

The topography has played a very important part in effecting differences in the texture of the soil in the more rolling areas, through the washing of the sandy and other soil materials from the surface, exposing the clay, with an accumulation of the surface soil material over the lower slopes. It has had little or no effect in the bottoms and the flatwoods.

The soils of the uplands are classed with six series, the Orangeburg, Ruston, Susquehanna, Caddo, Lufkin, and Crowley. The Orangeburg and Ruston soils are well drained, while the Susquehanna soils have imperfect underdrainage. The Crowley and Caddo soils are for the most part rather poorly drained, and the Lufkin soil is very deficient in drainage.

The Orangeburg and Ruston series are derived from Coastal Plain sedimentary deposits of sand and clay. Both series have gray to brownish-gray surface soils, but they differ in color and structure of the subsoil, the color of the Orangeburg being deep red, and that of the Ruston dull red or reddish yellow. The Orangeburg subsoil is more friable than that of the Ruston, although the latter is by no means so plastic as the subsoil of the Susquehanna. Only one type of the Orangeburg series, the fine sandy loam, is encountered in Drew County. The Ruston series is represented by three types, the fine sandy loam, very fine sandy loam, and silt loam.

Three members of the Susquehanna series are mapped, the gravelly sandy loam, very fine sandy loam, and silt loam. These soils are gray to reddish, and are underlain by a mottled red and gray or red, gray, and yellow, plastic, heavy clay subsoils. Red is nearly always the predominating color in the subsoil, the other colors appearing only as mottlings. Gray is more conspicuous as a rule in the lower than in the upper subsoil. The material is derived from extent of each soil type mapped in Drew County.

The types in the Caddo series have grayish to brownish-gray soils, and mottled gray and yellow or red subsoils. The lower subsoil is compact, but characteristically more friable than the corresponding section of the Susquehanna soil. Drainage usually is poor. Two members of this series, the very fine sandy loam and the silt loam, are recognized in Drew County.

In the Lufkin series the surface soils typically are light gray. The subsoil is gray to mottled gray and yellow, and stiff and impervious. The topography is prevailingly flat and together with the impervious subsoil renders drainage poor, water often standing on the surface for long periods after heavy rains. This series is represented by a single type, the Lufkin silt loam.

The Crowley series includes the prairie areas. The surface soil varies from dark brown or dingy brown to brownish gray, and is underlain by mottled gray and red, plastic clay. The topography is prevailingly flat, and drainage for the most part is rather poor. The silt loam is the only member of the series mapped in this county.

The bottom-land soils of the county are classed with three series, the Ochlockonee, Bibb, and Portland. These soils consist of material deposited over the flood plains of the streams by overflow water. All the bottom soils except the Portland very fine sandy loam are subject to overflow. Between overflows most of the soils have fair drainage.

The material of the Ochlockonee and Bibb series has been washed from the soils of the local uplands. The Ochlockonee soils are brown, with a brownish or yellowish subsoil. They are fairly well drained except during periods of overflow. Only one type, the silt loam, is mapped in Drew County.

The Bibb soils are distinguished from the Ochlockonee by the light-gray color of the soil and the impervious subsoil of gray to white or mottled gray, white, and yellow color. Drainage is very deficient. The silt loam is the only member of the Bibb series encountered in this county.

The Portland series, which represents alluvium containing some wash from the Red Beds of Oklahoma, is characterized by brown surface soils and a salmon-red or brownish-red to mottled grayish, reddish, and brownish subsoil. It includes three types, the very fine sandy loam, silty clay loam, and clay.

The following table gives the name and the actual and relative extent of each soil type mapped in Drew County.

Areas of different soils.

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Caddo silt loam.....	61,632	30.9	Ruston very fine sandy loam...	24,640	4.5
Slope phase.....	105,664		Bibb silt loam.....	14,912	2.8
✓ Susquehanna silt loam.....	61,760	11.4	✓ Lufkin silt loam.....	12,416	2.3
✓ Ochlockonee silt loam.....	55,040	10.2	✓ Ruston silt loam.....	8,960	1.7
Portland clay.....	44,672	8.9	Orangeburg fine sandy loam....	6,656	1.2
Poorly drained phase.....	3,456		Susquehanna gravelly sandy		
✓ Caddo very fine sandy loam....	40,768	7.5	loam.....	5,888	1.1
✓ Portland very fine sandy loam..	33,536	6.2	Crowley silt loam.....	2,752	0.9
✓ Susquehanna very fine sandy			Flat phase.....	2,176	
loam.....	27,392	5.0	✓ Ruston fine sandy loam.....	3,328	0.6
Portland silty clay loam.....	23,552	4.8	Total.....	542,080	
Poorly drained phase.....	2,880				

ORANGEBURG FINE SANDY LOAM.

The surface soil of the Orangeburg fine sandy loam consists of 6 to 8 inches of gray to brownish-gray fine sand or loamy fine sand to slightly reddish brown fine sandy loam, while the subsurface layer consists of a yellowish-gray to pale-yellow or reddish-brown fine sandy loam, ranging from 2 to 8 inches in thickness. Below this the subsoil proper is encountered, consisting of a red, friable sandy clay which at 25 to 30 inches frequently changes to a friable fine sandy loam or sandy loam. This lower part of the subsoil, although often containing less clay than the upper subsoil, is frequently more compact. Loosened fragments of this compact stratum, however, are very friable. In places the upper subsoil is stiffer than is generally characteristic of the Orangeburg fine sandy loam, but it is not so stiff as the subsoil of the Susquehanna series. In the shallow areas of the type the soil has a reddish cast when plowed.

Some small areas have gravel on the surface and through the 3-foot section. The more extensive gravelly areas are indicated on the soil map by gravel symbols, such as the area 4 miles south of Monticello along the Hamburg Road. Usually these gravelly areas are closely associated with the Susquehanna gravelly sandy loam. Occasionally the gravel occurs in beds, with interstitial reddish sandy clay material. The gravel consists mainly of chert, with some quartz. Another variation of the type is in the depth at which the heavy sandy clay of the subsoil is encountered. Frequently it occurs at 7 to 10 inches, whereas in other places it is entirely absent, the subsoil being a deep-red sandy loam to fine sandy loam.

The Orangeburg fine sandy loam is confined to irregularly distributed areas in the rolling upland belt. Typical areas occur a few miles south of Monticello. The type occupies the tops of the broad divides and extends well down the slopes, where it grades into the

Susquehanna soils. The boundaries between the Orangeburg and Susquehanna series usually are rather indefinite, the fine sandy loam material of the Orangeburg having been washed over the plastic clay strata which characterize the Susquehanna soils. In other situations the break of the slope marks the boundary between the two soils.

The topography is predominantly rolling, although there are some steep slopes, especially along the small drainage courses. These steep slopes are subject to excessive erosion, which already has depreciated the agricultural value of some of the type. Both surface drainage and underdrainage of all the type is well established.

This is one of the better soils of the upland, and practically all of it is, or has been, in cultivation. It was originally forested with white, black, red, and blackjack oak, and hickory, with some sweet gum and pine.

There is no highly specialized agriculture on the type, although there are many small orchards, chiefly of peaches, pears, and plums. Elberta peaches of good quality are produced without any systematic care of the trees. There is a prevailing opinion that the Orangeburg and the adjoining Susquehanna soils are equally well adapted to fruit. The trees on the Orangeburg soil, however, are much thriftier and more vigorous than those on the Susquehanna soils. Reliable estimates of the yield of peaches on the type are not obtainable, but the crop is profitable. Pears of exceptional quality are produced, but the trees suffer severely from blight. Plums and small fruits, including strawberries and blackberries, do particularly well. Large yields of Irish potatoes and sweet potatoes are obtained, but these crops are grown only for home use.

Of the staple crops cotton and corn are grown almost exclusively. In the last few years some attention has been given to crop rotations, including beans and peas, which crops, with peanuts, are occasionally drilled between rows of corn. Cotton yields from one-fourth to three-fourths bale per acre and corn from 15 to 25 bushels, depending on the season, the fertilization, and the thoroughness of seed-bed preparation. The soil is bedded for both cotton and corn just before planting. Occasionally corn is planted in the water furrow, the soil of the ridges being gradually worked toward the rows in subsequent cultivation so that after the last working the plants occupy low ridges. Terracing or counter farming on land subject to erosion is receiving increased attention.

From 200 to 300 pounds per acre of complete fertilizer analyzing 10 per cent phosphoric acid, 2 per cent nitrogen, and 2 per cent potash was commonly used on cotton and corn until recently. Prices having become almost prohibitive, a mixture of acid phosphate and

cottonseed meal, applied at the rate of 200 to 300 pounds per acre, is now used in the few cases where the fields are fertilized.

Areas of this soil in cultivation near Monticello sell for \$30 to \$35 an acre. Land some distance from this town toward the Lincoln County line can be bought for \$15 to \$20 an acre, depending mainly upon the improvements. Much of the type is held in conjunction with other soils.

Probably no soil in the county offers better opportunities for the profitable production of a wide variety of crops than the Orangeburg fine sandy loam. The present system of extensive corn and cotton production without adequate provision for the maintenance of the supply of organic matter in the soil is not favorable for continued good yields. A leguminous crop should be plowed under occasionally. Crops such as soy beans, velvet beans, cowpeas, peanuts, lespedeza, bur clover, and vetch do well and can be used to good advantage in rotation with other crops to improve the soil. At the same time they are valuable seed and feed crops. The growing of peanuts for forage for hogs, and peanuts and soy beans for oil offer opportunity for further crop diversification.

The control of erosion is one of the important problems in the management of this soil. Terracing or contour farming is necessary in the more sloping areas, and winter cover crops may be grown to prevent the formation of gullies.

The open porous nature of the subsoil makes the type particularly favorable for fruit growing. The climate is very favorable for such fruits as peaches, pears, plums, blackberries, and strawberries, and their production, with proper management, should prove profitable.

Fall plowing gives good results, and is a valuable means of combating the boll weevil. Crop rotation, clean cultivation, hastening maturity through proper cultural methods and fertilization, and the use of early varieties are other steps necessary to success with cotton under existing conditions.

RUSTON FINE SANDY LOAM.

The typical Ruston fine sandy loam consists of a gray to brownish-gray fine sandy loam 8 or 10 inches deep, underlain by a pale-yellowish or slightly reddish, heavy fine sand, which extends to a depth of 15 to 18 inches. The subsoil consists of reddish-yellow sandy clay, continuing without important change throughout the remainder of the soil section.

In many places, especially where the type approaches areas of the Caddo soils, the subsoil below about 20 inches is light yellow, mottled slightly with red. In other places the subsoil below about 20 inches is very compact, yet friable when fragments are broken loose, and

strongly mottled with yellow, gray, and brownish red, being similar in this respect to the subsoil of the Susquehanna series, but lacking the very plastic structure characteristic of the Susquehanna. There are also included small areas containing a small quantity of chert and quartz gravel in the soil and subsoil. Such areas, where of sufficient extent to be shown on the map, are indicated by gravel symbols. Slight variations in the color of the subsoil are believed to be due to differences in the degree of oxidation of the material, the better drained and aerated soils having a deeper red color, approaching that of the Orangeburg soils.

The Ruston fine sandy loam is confined to the rolling uplands of the western part of the county, being most prominent in the southwestern part. It occurs on low, narrow ridges and on the slopes toward streams. The surface varies from undulating to gently rolling or sloping. The type is not very extensive, but it has a rather wide distribution in small, isolated areas. Both surface drainage and subdrainage are well developed.

The type is easily cultivated, on account of its sandy nature, but the subsurface material and subsoil are heavy enough to absorb and retain a good supply of moisture. There is some erosion on the steeper slopes, which may be prevented by terracing and growing winter cover crops.

The original timber growth consisted of oak of different varieties, pine, hickory, and gum. Pine was most plentiful in the southwestern part of the county. It is estimated that about one-half the type is cleared, the remainder being cut-over land, most of which is still unfenced and constitutes an open range. This is a good general-farming soil. Cotton is the main crop. Usually enough corn is grown for the work stock. Corn yields 15 to 30 bushels per acre, and cotton one-third to three-fourths bale in normal seasons. Sweet potatoes yield about 150 bushels per acre, and Irish potatoes 80 to 100 bushels. These crops are grown for home consumption only.

Peaches, plums, pears, and small fruits do well, but are not grown commercially. The trees seem to be as thrifty as on the Orangeburg fine sandy loam.

A few cows and hogs are kept on all the farms, but there is no specialized animal industry. The surplus butter is sold locally. Hogs usually are sold off after feeding on mast obtained on adjoining areas of the Caddo silt loam and the Susquehanna soils, which are much more extensive than this type.

No definite selling value can be given for this land on account of its irregular occurrence in small areas. In crop adaptation the type is similar to the Orangeburg fine sandy loam, and it requires about the same treatment.

RUSTON VERY FINE SANDY LOAM.

The soil of the Ruston very fine sandy loam consists of a grayish to brownish very fine sandy loam, underlain at a depth of 4 or 5 inches by a yellowish, heavy very fine sandy loam which grades at about 10 inches into a yellowish to reddish yellow sandy clay loam. This passes at 15 to 18 inches into a yellowish-red, friable sandy clay. In places the subsoil below about 20 inches is light yellow, mottled with red and gray.

This type as mapped includes three small areas of terrace, or second-bottom, soil along the Saline River west of Moody, an area of about 25 acres along Wolf Creek 5 miles southwest of Collins, and another of about 15 acres along Cutoff Creek 10 miles north of Collins. These terrace areas represent the Kalmia very fine sandy loam, a type which is not sufficiently extensive to warrant separation. Typically the soil consists of about 12 inches of brown very fine sandy loam, grading through a yellowish very fine sandy loam into a sandy clay loam, which is underlain at 20 to 25 inches by yellowish-red, friable sandy clay. These terrace areas are all in cultivation, except that in the Saline River bottoms. They lie from 6 to 10 feet above the first bottoms.

The Ruston very fine sandy loam occupies gentle slopes of the rolling upland north and west of Monticello and in the vicinity of Wilmar. It occurs as small, isolated areas separated by types of the Susquehanna and Caddo series. The surface features vary from gently undulating to sloping. Both the soil and subsoil are well drained. The type is easily cultivated, and because of its good natural drainage and relatively high productiveness was the first of the upland soils to be cleared for farming.

Practically all the type is in cultivation. Cotton is the chief crop, with corn next in importance. The yields and quality of vegetables grown for home use indicate that the soil is well suited to truck growing. Cotton has been known to produce three-fourths bale per acre on the best land of this type, but yields of more than one-half bale per acre are rare under present conditions. This type, like the Ruston fine sandy loam, is adapted to the production of certain tree fruits and small fruits. Peaches and plums do well, and are grown to a small extent. No effort is made to control insect pests and fungous diseases.

This is one of the strongest of the upland types. It is still producing good yields of cotton, corn and oats. Continuous production of these clean-culture crops will ultimately cause a deterioration of the soil unless the supply of organic matter is maintained.

RUSTON SILT LOAM.

The surface soil of the Ruston silt loam is a brown silt loam about 8 inches deep. This is underlain by a subsurface layer of similar texture, but a reddish-brown color, which continues to 15 or 16 inches. The subsoil consists of a yellowish-red to faint-reddish, friable silty clay, grading in some places between 25 and 30 inches into a very compact though friable silty clay of light, grayish yellow or mottled reddish-brown color.

In extreme variations of the type toward the Caddo silt loam the subsoil below about 20 inches is strongly mottled with gray, yellowish brown, and red, and is a friable silty clay loam in texture, but the surface and subsurface material is typical of the Ruston silt loam. In the vicinity of Florence the surface soil contains appreciable quantities of very fine sand. In the vicinity of Collins, where the soil occurs on sharp breaks along small streams, the subsoil is lighter in color than typical, being light gray to grayish yellow, or mottled yellow, gray, and red, resembling the Caddo silt loam.

The Ruston silt loam occurs mainly in the flatwoods belt of the upland. The most extensive area lies southeast of Florence. Small areas of 40 to 300 acres are irregularly distributed over the rolling upland, separated by areas of the Caddo and Susquehanna soils and the sandy types of the Ruston series. The surface varies from flat, in the northeastern part of the county, to sloping or rolling, in the northwestern part. Areas in the vicinity of Collins have sharp slopes, which give them a relatively low agricultural value. Drainage, both surface and subsurface, is adequate.

All this type originally was forested with different varieties of oak, hickory, sweet gum, and pine. About 80 per cent of it is now in cultivation, and it is one of the best upland general-farming soils in the county. Cotton and corn are the principal crops. The type is well adapted to cotton, although the yield is not as large as on the bottom soils. The crop produces from one-fourth to 1 bale per acre, with an average of one-half to three-fourths bale. Some corn is grown on practically all the farms, chiefly to feed the work stock. Yields vary from 15 to 40 bushels per acre, depending largely on the season. Generally corn does better on the sandy soils of this series than on the silt loam, although good yields can be obtained where the seed bed is carefully prepared and the crop given proper attention. Both Irish and sweet potatoes are grown for home consumption. These crops yield 100 to 200 bushels per acre. The soil is well suited to potatoes and to various truck crops, and with such accessible markets as Memphis, Pine Bluff, and Little Rock, trucking should prove profitable. Japan clover grows wild and yields about 1 ton of hay per acre per cutting. Two cuttings each season can be

made, but where this is done reseeding is necessary the following year. Cowpeas and soy beans are grown on some farms, largely between rows of corn, and are pastured with the stalks. The growing of these legumes invariably results in increased yields of succeeding crops of corn.

Land of this type is plowed in the spring just before planting time. Cotton or corn are grown on ridges. Some fertilizer has been used on this type, generally a complete mixture, ordinarily containing 10 per cent phosphoric acid, 2 per cent nitrogen, and 2 per cent potash. Fertilizers are applied to cotton or corn land just before planting. In some cases cottonseed meal at the rate of about 200 pounds per acre is used as a substitute for the complete fertilizer.

Some areas of the Ruston silt loam have been in cultivation for 50 years or more and are still productive. Where improved, as near Florence, the type sells for \$15 to \$20 an acre. Few farms are composed entirely of this type, and it is farmed in conjunction with other upland soils.

In the following table are given the results of mechanical analyses of samples of the soil and subsoil of the Ruston silt loam:

Mechanical analyses of Ruston silt loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
461515.....	Soil.....	0.6	1.0	0.7	3.6	11.9	68.9	13.0
461516.....	Subsoil.....	.6	.9	.6	2.5	9.6	66.5	18.9

SUSQUEHANNA GRAVELLY SANDY LOAM.

The Susquehanna gravelly sandy loam is a grayish, gravelly sandy loam or fine sandy loam to reddish gravelly clay loam, underlain at depths of a few inches to about 15 inches by a red, plastic clay or gravelly clay, mottled in the upper part with pale yellow and in the lower part with bluish gray. The gravel in soil and subsoil consists mainly of water-rounded chert and quartz. The most important variation in this type is in the depth at which the heavy clay subsoil is encountered. In some places the gravelly sandy loam stratum continues to 20 or 22 inches. Such areas have a higher agricultural value than those where the clay lies at a shallow depth.

This soil is confined to the rolling upland in the western half of the county. It occurs characteristically on slopes below areas of the Orangeburg fine sandy loam, but small areas also occupy the tops of hills, knolls, or ridges. The surface varies from steeply sloping to hilly. The run-off is rapid, because of the topography and largely

because of the compact nature of the subsoil, which obstructs the downward movement of water. The slopes in many places are badly eroded and gullied.

The type is not very extensive, and it is of relatively little importance. Only small areas occurring within farms composed mainly of other soils are cultivated. The staple crops common to the region are grown, and fair yields are obtained. This soil is of much lower agricultural value than the other Susquehanna soils. The timber growth consists largely of blackjack oak, with some hickory and post oak.

The type is deficient in organic matter, and this deficiency, together with its tendency to erode badly, must be recognized in any effort to improve it. The steeper slopes are best used for pasture or wood land.

SUSQUEHANNA VERY FINE SANDY LOAM.

The surface soil of the Susquehanna very fine sandy loam consists of light-brownish very fine sandy loam passing quickly into yellowish-brown very fine sandy loam, and this at 5 to 8 inches into yellowish-red or dull-red, friable sandy clay or silty clay. Mottlings of pale-yellow appear in this material at any depth from 12 to 20 inches, and it then passes abruptly into plastic, sticky, heavy clay mottled with red, pale yellow, and bluish-gray, the latter color becoming more conspicuous with increase in depth. On slopes a stiff, red clay frequently occurs immediately beneath the surface soil, with drab mottling only in the lower part, while in other places drab is the most conspicuous color throughout the subsoil. The change from surface soil to subsoil usually is gradual, the material grading through yellowish sandy clay and silty clay; there are places, however, where the change is abrupt. In less well-drained places and in the lower situations the upper subsoil frequently is lighter red or even yellowish. Another variation consists of small areas which contain a small quantity of chert and quartz gravel. The more prominent of such areas are indicated on the map by gravel symbols, and where large enough they are separated as the gravelly sandy loam of the series.

The Susquehanna very fine sandy loam is confined to the rolling upland in the western part of the county. It occupies the tops of divides and long, gradual slopes to streams. It usually separates higher lying areas of the Orangeburg fine sandy loam from the Caddo and Susquehanna silt loams. One large area lies about 3 miles south of Monticello. Another adjoins the Lincoln County line in the north-central part of the county. The surface of the type varies from sloping to strongly rolling or hilly. Subdrainage is inadequate, but on account of the rolling topography and the compact

subsoil the surface drainage frequently is excessive. Gullies form rapidly in this soil, and erosion is one of the main difficulties in farming.

The Susquehanna very fine sandy loam is an important soil. It is extensive, and about 35 per cent of it is in cultivation, the remainder being cut-over timber land. The original forest growth consists of post oak, white oak, black oak, blackjack oak, hickory, and some pine. Blackjack oak is most prominent on narrow ridges where the heavy, plastic subsoil lies near the surface. Such areas occur about $1\frac{1}{2}$ miles southwest of Touchstone Prairie and about 6 miles south of Monticello along the Hamburg Road, and represent some of the poorest land in the county. They are spoken of as "blackjack ridges," but are distinguished from areas of the Orangeburg fine sandy loam, which support a similar growth but are more productive.

Cotton and corn are the most important crops. Cotton yields one-fourth to one-half bale per acre in normal seasons, and corn averages about 20 bushels. Sweet potatoes and Irish potatoes are grown for home use and give good yields.

Peach trees have been started in a few small orchards south of Monticello, apparently in the belief that this soil, being sandy and reddish in color, is similar to the Orangeburg fine sandy loam on which peaches do particularly well. The trees on the Susquehanna type are not so thrifty, although peaches are grown with success for family use in small areas having good drainage.

The methods of farming on this type are the same as those prevailing throughout the county. The land is bedded in the usual manner with one-horse plows. No definite rotation is followed, although the acreage in such crops as cowpeas, soy beans, peanuts, and velvet beans is increasing. A gradual decline in the productivity of the soil, probably due to the one-crop system, is noticed. Fields are often abandoned after a few years of cropping and allowed to lie fallow for several years. Frequently gullies form, causing serious injury to the land. Crops on this soil suffer quickly from drought. A few farmers use a complete fertilizer on corn or cotton. Cotton seed or cottonseed meal is used occasionally.

Land values vary with improvements and the distance to towns. The prevailing price is \$10 to \$15 an acre.

Yields on this type could be increased by deeper preliminary plowing, and more frequent shallow cultivation during the growing season to conserve moisture. The soil is naturally low in organic matter, which may be supplied by growing leguminous crops. Like the Susquehanna silt loam, this type is well adapted to cowpeas, soy beans, peanuts, and lespedeza, and live-stock production apparently could be made an important industry. Both hogs and cattle could be kept

in large numbers on the forage produced. Such pasture grasses as Bermuda grass and carpet grass do well. Mixtures of Sudan grass with cowpeas or soy beans produce large quantities of a well-balanced hay.

SUSQUEHANNA SILT LOAM.

The Susquehanna silt loam consists of light-brown or grayish-brown silt, underlain at 5 to 8 inches by yellow or reddish-yellow silty clay loam containing enough fine sand to give a moderately friable structure, and passing at depths of 12 to 30 inches into mottled red and pale-yellow, plastic, heavy clay. This quickly grades into mottled red and bluish-gray, sticky, heavy clay. In some places the upper subsoil is red with only slight drab mottling and in others the drab material is most conspicuous in the upper subsoil.

The principal variation of the type is in the depth at which the heavy subsoil is encountered. The change from the surface soil to the subsoil usually is abrupt. Some areas contain chert and quartz gravel. There are occasional dome-shaped mounds on which the soil usually consists of Susquehanna or Ruston very fine sandy loam. The Susquehanna silt loam differs little from the other upland silt loam types in the appearance of the surface 12 inches of soil, but the yellowish to mottled reddish-yellow and gray color of the subsurface material and the plastic structure of the subsoil strata distinguish it from the types of other series. It is an extensive and important soil, widely distributed over the rolling upland. The principal areas occur northwest of Monticello and in the southwestern part of the county. There are many smaller areas intricately associated with the other upland soils. The type occupies rather broad divides and slopes to streams, and the topography varies from gently rolling to steeply sloping. Surface drainage is well established on account of the rolling topography, but the underdrainage is very inadequate, the heavy, plastic clay subsoil impeding the downward movement of water. Areas along steep slopes are subject to severe washing, which soon exposes the clay subsoil. Crop production on such eroded land is very unsatisfactory.

It is estimated that about 40 per cent of the type is cleared, but not all of this is cultivated, as some fields have been abandoned. Practically all the type is suitable for cultivation; most of it is smooth enough for the use of modern farm machinery, including tractors.

Those areas having greater depth to the tough clay are more valuable agriculturally than the shallower areas, which are only moderately productive and are susceptible to drought under prevailing systems of cropping. The timber growth consists largely of post oak, white oak, black oak, blackjack oak, and hickory, with a few pines. Post oak predominates. Blackjack oak is much more extensive in

areas where the clay lies at shallow depths, and a prominent growth of these trees indicates a rather unproductive soil.

Cotton and corn are the most important crops, although in the last few years increasing attention has been given to oats, cowpeas, beans, and Sudan grass. Cotton yields as much as three-fourths bale per acre on the deeper soil, and corn from 15 to 25 bushels. Oats have not been very successful, owing largely to the fact that the crop has been grown on the poorest land, under careless methods of cultivation. In small orchards peaches of good quality are produced, but the soil is not believed to be well suited to orcharding on a commercial scale. It has proved well suited to the leguminous crops, which should be more generally grown to build up and maintain the productiveness of the soil. Land of this type ordinarily deteriorates quicker than the Ruston and Orangeburg soils under a one-crop system. Little attention has been given to crop rotation. The fields are plowed in the spring before planting to cotton and corn. The steep slopes are given contour cultivation, but considerable damage from soil erosion has taken place. The soil dries out very easily and crops suffer quickly from drought.

The ordinary grades of mixed fertilizer are used to some extent. Cotton seed and cottonseed meal are also applied to the fields with good results. Green manuring is not practiced, and the little barnyard manure available generally is used in the gardens.

Land of this type varies greatly in price. Near Monticello improved farms sell for \$15 to \$25 an acre. Farther away from the town prices rarely exceed \$15 an acre, the prevailing price being about \$12 for improved land.

This soil offers good opportunities for farming. It is easily maintained in a productive condition by careful cultural methods, including the growing of cowpeas, velvet beans, soy beans, and lespedeza in rotation with corn, oats, cotton, and Sudan grass; the control of erosion by contour plowing or terracing; the growing of winter cover crops; plowing under green-manuring crops to increase the organic-matter content of the soil; and deeper plowing, with shallow cultivation during the growing period. All the legumes mentioned do well on this soil and are grown extensively on the same type in other parts of the South. Bermuda grass furnishes good grazing. Carpet grass makes a good growth, and an abundance of leguminous forage can be produced cheaply, so that cattle raising and hog raising apparently could be made important industries.

CADDO VERY FINE SANDY LOAM.

The Caddo very fine sandy loam is a gray to brownish-gray very fine sandy loam, passing at 6 or 8 inches into a pale-yellow very fine sandy loam which is underlain at 12 to 15 inches by a yellow, friable

sandy clay loam to sandy clay mottled with gray. The gray mottling increases with depth. In the lower 6 inches of the 3-foot section the material usually is a compact silty clay mottled with gray, yellow, and reddish brown, the gray being most conspicuous. In a few places this layer is almost entirely gray.

Dome-shaped mounds, 2 to 4 feet in height and 15 to 60 feet in diameter, give part of this type a billowy or hummocky appearance. The surface soil on these mounds is mainly a brownish to grayish-brown very fine sandy loam, underlain at about 20 inches by reddish-yellow or mottled red and yellow very fine sandy clay loam, similar to the Ruston soil. On the large mounds the soil often consists of typical Ruston very fine sandy loam.

The type shows a slight variation in texture in the vicinity of Ladelle, in the southwestern part of the county. The surface soil approaches a loam, but in color and structure the subsoil is typical. The type also includes small areas containing some chert and quartz gravel throughout the soil section. Conspicuous areas of this sort are indicated on the soil map by gravel symbols.

The Caddo very fine sandy loam is irregularly distributed in relatively small areas throughout the rolling upland. Characteristically it occupies gradual slopes from higher lying areas of Ruston and Susquehanna soils to the Caddo silt loam of the flatwoods. In the vicinity of Ladelle it separates the Crowley silt loam from the flatwoods. In the northwestern part of the county it occupies slopes to streams. The topography is prevailingly sloping, and all the type is cultivable. The drainage of most of the type is only fair, although better than that of the silt loam. The subsoil is much more friable than that of the Susquehanna soils, resulting in better oxidation of the soil material and better underdrainage.

It is estimated that about 30 per cent of the type is farmed, the cultivated areas lying mainly in the southwestern part of the county. The forest growth is similar to that on the silt loam, consisting of the usual hardwoods and, in the southwestern part of the county, of pine. Practically all the merchantable timber has been cut. Cotton is the principal crop. Yields of one-fourth to one-half bale per acre are obtained in normal years. Corn is grown for home use, and yields from 20 to 25 bushels per acre. Other crops are of little importance, although there is a growing recognition of the value of legumes—beans and peas—for improving the productiveness of the soil. Native grasses, including Bermuda grass, grow luxuriantly and afford good pasturage. Japan clover does particularly well, but is given little attention. The soil is locally considered fairly well suited to peaches, and there are some very thrifty trees on the well-drained areas. As in the case of the silt loam of the series, it is considered advisable to plant crops on ridges, on account of the lack of

thorough drainage. This soil gives an acid reaction with litmus paper. The acidity can be remedied by applications of burnt lime or ground limestone. Liming for cotton and corn without supplying organic matter, however, may not be of any great benefit.

In general this type is similar to the Caddo silt loam in crop adaptation. Its lighter texture makes it somewhat warmer and earlier, but it is not so retentive of moisture and plant food. With proper methods of cultivation the soil is a valuable farming type.

This land sells for \$10 to \$15 an acre, depending on the location and improvements.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of the Caddo very fine sandy loam:

Mechanical analyses of Caddo very fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
461503.....	Soil.....	1.5	6.6	8.3	21.1	18.1	39.0	4.7
461504.....	Subsoil.....	1.2	5.4	7.5	20.5	10.0	41.7	13.3

CADDO SILT LOAM.

The Caddo silt loam in places is a light-brown to yellowish-brown silt loam underlain at 6 to 10 inches by a yellow or mottled yellow and rusty-brown, friable silty clay loam, which passes at 26 to 30 inches into rather compact silty clay loam or silty clay mottled with pale yellow and bluish gray. This material contains black and rusty-brown concretions and concretionary material, and has a slightly friable structure. In places the type is a mottled yellowish-brown, rusty-brown, and grayish silt loam underlain at 6 to 8 inches by a mottled gray or bluish-gray, pale-yellowish, and rusty-brown silty clay loam which passes at 28 to 30 inches into quite compact silty clay loam to silty clay mottled with bluish gray and yellowish, and containing considerable dark and rusty-brown concretions and concretionary material. The yellowish and to some extent the bluish-gray material is plastic.

There is more gray and rusty-brown mottling in the more poorly drained flats, such areas representing a gradation of the type toward the Lufkin silt loam. On some of the faint slopes where the drainage is somewhat better the subsoil is more uniformly yellowish. There are occasional dome-shaped mounds with a more brownish soil and more uniformly yellowish subsoil, gray mottling sometimes not appearing within the 3-foot section. Small iron concretions are present in the surface soil, in places being especially noticeable on

the surface after rains. At Collins, red clay is exposed in a few of the deeper cuts, but these outcrops have not affected the soil.

The Caddo silt loam with its slope phase comprises by far the greater part of the flatwoods upland. It occupies a wide belt in the east-central part of the county separating the rolling upland on the west from the Bayou Bartholomew bottoms on the east. It lies 15 to 25 feet above the first bottoms, and 60 to 90 feet below the highest parts of the rolling upland. Its position is terracelike.

The topography is prevailingly flat, and drainage is deficient. Owing to the compact to impervious character of the deeper substratum water does not pass downward rapidly, and in many flat situations the soil is "late" in the spring. Crops are easily injured by excessive rainfall.

This type has produced considerable revenue from lumber and from the sale of mast-fed hogs. The timber growth consists almost entirely of hardwood, mainly white oak, black oak, post oak, water oak, hickory, and gum, with some pine in the southern part of the county. Practically all the merchantable timber has been removed, the land being in the cut-over state.

Farming on the Caddo silt loam is mainly on the slope phase along the main roads. About 25 per cent of the typical soil is farmed, as compared with about 50 per cent in the case of the phase. Few of the farms are equipped with modern buildings, and, in general, agricultural conditions are poor. Cotton is the chief crop. Not enough corn is grown by some farmers to supply their own needs. For both cotton and corn the land is plowed to a depth of 3 to 5 inches as soon as it has dried out somewhat, and the soil is thrown up in narrow, shallow beds. When these beds are dry the surface is broken with a spike-tooth harrow, the land is smoothed off with a drag, and when the soil has warmed enough for the seed to germinate the crop is planted on the beds. Corn can be planted as early as the first part of April, and as late as the latter part of June. Cotton is planted from the middle of April to May. The cotton is thinned when a few inches high, and is cultivated and hoed several times during the period of its growth. Picking begins the latter part of September. Little commercial fertilizer is used and few farmers apply barnyard manure systematically.

Land of this type in the cut-over condition can be bought for \$8 to \$12 an acre, depending upon the improvements and the location with respect to towns and railroads.

This type offers good opportunities for stock farming, but comparatively little has been done along this line. Large numbers of hogs are raised. These run at large and are fattened on the mast, being given little or no care. As most of the timber is now cut less

mast is available. The soil is well adapted to a wide range of forage crops. Leguminous crops, lespedeza, Bermuda grass, carpet grass, and wild grasses afford good permanent pasture.

One application of manure on this soil results in increased yields of corn and cotton for several years. Much of the type is in need of improved drainage. The soil is acid, which is the case with most of the upland soils. This condition can be remedied by applying burnt lime or ground limestone. Limestone can be obtained cheaply in many parts of the State. The Caddo silt loam is well adapted to the growing of rice, which is extensively produced on similar soil in the southwestern part of the State.

Caddo silt loam, slope phase.—Typically the surface 10 inches of the Caddo silt loam, slope phase, consists of a light-brown silt loam with a slight yellowish tinge below about 6 inches. At 10 or 12 inches the material grades into a yellowish silt loam which in turn is underlain at 20 to 30 inches by a mottled gray, yellow, and in places reddish-brown silty clay loam to silty clay. This becomes very compact in the lower part of the 3-foot section. Iron concretions are present in the surface soil and subsoil. In the vicinity of Collins this phase occupies badly eroded spots on stream slopes where the surface soil has largely been removed by washing and the yellowish subsoil is exposed. The phase in general is better drained than the main type, owing to the proximity of streams. Its topography varies from slightly sloping to undulating, with scattered mounds. Many of the mounds represent areas of the Ruston soils, but they can not be mapped separately on account of their small size.

In the following table are given the results of mechanical analyses of samples of the soil and subsoil of the typical Caddo silt loam:

Mechanical analyses of Caddo silt loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
461521.....	Soil.....	1.4	1.4	9.9	9.4	11.4	63.5	12.0
461522.....	Subsoil.....	.7	1.3	.7	7.0	11.1	61.1	18.1

LUFKIN SILT LOAM.

The surface soil of the Lufkin silt loam consists of 6 to 8 inches of gray silt loam somewhat mottled with yellowish or rusty brown. Below this is encountered a bluish-gray silty clay loam, generally mottled with yellow and often with rusty brown, and passing at any depth from 24 to 30 inches into dark ashy-gray or bluish-gray, plastic, impervious clay which in the lower part of the 3-foot section is often tough. The presence of this layer and the level or

slightly depressed surface are responsible for the poor drainage. Often the lower stratum is much drier than that overlying it, the grayish material usually being dry and powdery, even when the surface is covered with water. Black concretions or concretionary material is present in many places in the lower subsoil. When moist this soil is friable but on drying out it bakes hard. When dry it is light gray or almost white.

Dome-shaped mounds 3 to 4 feet high and 30 to 35 feet in diameter occur within areas of this type, but are less common than in areas of the Caddo soils. The soil of the mounds usually is yellowish, with a mottled gray and yellow lower stratum. A few of the mounds are occupied by the Ruston very fine sandy loam, the subsurface material and subsoil being reddish yellow to dull red. The variations in color are due to differences in drainage and aeration, which result in more complete oxidation in some places than in others.

The Lufkin silt loam occurs in scattered areas throughout the flat-woods belt, the largest areas lying 8 to 9 miles southwest of Collins. Some of the larger areas cover one or two square miles, but there are many of only a few acres extent.

The surface is level, with some faint depressions, and the drainage is very poor, water often remaining on the surface until it evaporates.

The Lufkin silt loam is not cultivated. Where cleared it supports a fair growth of wild grasses and is devoted to grazing, most of it being in the open range. Its value for grazing could be greatly increased by clearing away more of the trees and the underbrush, which frequently grows so thick as to smother the grasses. Most of this land is in the cut-over state. The principal trees are water oak, sweet gum, and white oak.

This land is usually held in connection with the Caddo silt loam. It has a lower value than that type.

This type of soil has been used successfully for rice production in the southwestern part of the State, and much of the soil of the rice section in the central part of the State is quite similar to it. Under present economic conditions, however, the type seems best suited to grazing. It is prevailingly acid, and for profitable crop production liming and the establishing of good drainage are necessary.

CROWLEY SILT LOAM.

The Crowley silt loam consists of a dark-brown silt loam underlain at about 12 inches by light-brown to yellowish-brown silt loam which becomes heavier with depth, grading at about 18 inches into mottled gray or drab and reddish-yellow silty clay loam. This in turn is underlain at 20 to 22 inches by plastic silty clay mottled with gray, yellowish, and red, the red frequently predominating in the lower 6 inches of the 3-foot section.

In some places the clay subsoil is not encountered at depths of less than 30 inches, while in others it lies within 15 to 18 inches of the surface. The type also presents a slight variation in texture, in some areas the surface soil containing enough fine sand to give it a loamy structure. There is present also in local areas from 2 to 4 per cent of chert and quartz gravel, principally in the surface 15 inches. The more conspicuous of such areas are indicated on the map by gravel symbols. Near the Ashley County line 5 miles southeast of Ladelle the soil is somewhat lighter in color than typical, being light brown to grayish brown to a depth of about 15 inches. The subsoil is typical. The surface is flatter than in areas farther to the north, and drainage is not so well established.

The small mounds typical of most of the upland soils, particularly the Caddo silt loam, occur likewise in the Crowley silt loam, and are of about the same height and diameter as on the other soils. In places they are sufficiently numerous to make the surface billowy. The soil on the mounds possibly contains larger quantities of very fine sand than other parts of the type, especially where the mounds are most numerous.

The Crowley silt loam is encountered in Long Prairie, in the southern part of the county. It occurs mainly in a narrow strip extending from a point one-half mile north of the junction of the Monticello-Hamburg and the Ladelle-Collins Roads to the Ashley County line. The surface for the most part is gently undulating to undulating, and drainage as a rule is fairly well established, although in the southern part of the county along the Ashley County line, owing to the flat surface, it is rather deficient.

About 65 per cent of this type is either in cultivation or fenced for pasture. The agriculture is more diversified than in any other part of the upland. The farms as a rule are well kept, the fences are good, being constructed chiefly of wire, and the appearance of the farm houses indicates a generally prosperous condition.

Cotton, corn, and prairie hay are the principal crops, but some attention is given to wheat, oats, and the legumes. The yields of cotton and corn compare very favorably with those obtained on the best upland types. The cultural methods employed by a few farmers are very good. Several farmers from Kentucky have settled on this soil and are introducing the methods to which they are accustomed. The better farmers break the land in the fall or early spring to a depth of 4 to 6 inches with large 2-horse plows. The field is put in good condition by harrowing two or three times, and the seed bed is thoroughly prepared. Spike-tooth and disk harrows are used. As soon as the soil is dry and warm enough for the seed to germinate the crops are planted. Manure is carefully preserved and returned to the land.

In a few cases large fields of wheat and oats are grown. These crops make a vigorous growth where the land is thoroughly prepared and acid phosphate and ground limestone applied.

Crowley silt loam, flat phase.—The flat phase of the Crowley silt loam consists of a brown silt loam, slightly mottled with rusty brown. This is underlain at 6 to 8 inches by gray to brownish-gray silt loam which may continue without change throughout the 3-foot section, but frequently passes at 28 to 30 inches into impervious, plastic silty clay, mottled with gray or drab, yellow, and red. The lower silty clay subsoil is locally termed "hardpan," but there is no characteristic cementation of the soil particles as in a typical hardpan. Small iron concretions occur throughout the soil and subsoil.

This phase occupies several isolated prairie sections of varying extent within the flatwoods uplands. The largest of these are Touchstone, Wolf, Cooper, Tiffin, and Brush Prairies.

The surface of these areas is flat, and the soil is poorly drained and "crawfishy," though generally it dries out quickly and is easily cultivated. In some places, however, water remains on the surface until removed by evaporation. There are a number of shallow drainage ways that assist in carrying away the surface water.

This soil is so situated that it can easily be drained artificially, and drainage is now provided in part by ditching. Like the Caddo silt loam of the flatwoods, the phase can be underdrained by means of tile laid above the impervious subsoil layer. Although the land can be cultivated successfully without it, artificial drainage is highly beneficial.

The principal uses of this phase are the grazing of cattle and the production of prairie hay. Most of the hay is produced on Cooper and Tiffin Prairies. The grass in places is somewhat coarse for hay and in general the hay is of only fair quality. It frequently contains a rather high percentage of broom sedge, which lowers its feeding value. It is cut from June to October. The early cutting is better, but the yield is less than in the crops harvested later. The hay is baled, stored in sheds or barns, and fed as needed. A surplus is sold locally at \$6 to \$8 a ton. Lespedeza grows naturally on this soil, but owing to the strong, vigorous growth made by the wild grasses it seldom makes a thick stand unless seeded. This plant greatly improves the quality of the hay.

This prairie land is valued for grazing. Most of it can be bought for \$15 to \$20 an acre.

Dairying could probably be made an important industry on this soil, owing to the abundance of forage. The soil has also been found well suited to the growing of rice in Lonoke County, Arkansas, and in southern Louisiana. No expensive clearing, ditching, or leveeing

is needed to prepare this soil for rice culture. The total cost of an irrigating plant sufficient for flooding 200 acres has been estimated at \$2,000 to \$3,000.¹

OCHLOCKONEE SILT LOAM.

Typically the Ochlockonee silt loam is a brown silt loam 8 inches deep, grading into light-brown silt loam which extends to about 18 inches. Below this a yellowish-brown silty clay loam is encountered, which either continues without change to a depth of 3 feet or, retaining a uniform texture, changes in color to a mottled gray and yellowish brown.

The type includes several variations. In places the brown silt loam layer extends without important change to a depth of 3 feet or more. In some areas the subsoil below 20 inches is a mottled gray, yellow, and brownish silty clay loam, the proportion of gray material increasing with depth. The gray subsoil material is most prominent in areas of poor drainage.

As mapped the type includes areas of the Bibb silt loam, too small to be separated satisfactorily. These areas occupy poorly drained situations, such as exist along incipient drainage courses. There are also included small areas in which the soil is a very fine sandy loam to fine sandy loam, such as the narrow strips of first-bottom soil along the small streams south of Collins. These areas represent the Ochlockonee very fine sandy loam, but they are too small to be shown on a map of the scale used in this survey.

The Ochlockonee silt loam is an important first-bottom soil occurring along all the streams flowing through the upland. The material consists of wash from the surrounding upland soils, deposited in times of flood over the flood plains of the streams. Much of the type is subject to overflow.

The surface is prevailingly flat, with small ridges and minor depressions. Drainage between overflows is generally fair except in the low, depressed areas. The soil on the immediate banks of the streams usually is somewhat lighter in texture than that near the upland. There are many sloughs which serve as drainage ways in times of overflow. Usually the severity of the floods increases with the distance from the source of the streams. Thus the first bottoms along Cutoff and Wolf Creeks in the vicinity of Collins are so excessively overflowed as to render them unfit for farming, while nearer their sources the same streams are bordered by wide strips of cultivated land.

The Ochlockonee silt loam is rich in organic matter and very productive. About 50 per cent of it is in cultivation, the rest being

¹ Farmers Bul. No. 417, U. S. Dept. of Agr., p. 27.

forested. The native forest growth consists chiefly of white, black, and overcup oak, hickory, holly, dogwood, ash, gum, and cypress. Most of the land has been cut over, although a few small areas of the original growth remain.

The most important crops are corn, cotton, and sugar cane, with Bermuda grass and lespedeza for pasturage and hay. In favorable seasons when destructive overflows do not occur, corn yields from 40 to 50 bushels and cotton upward of 1 bale per acre. Corn does much better than cotton in overflowed areas. In general this soil requires only good farming to produce profitable yields indefinitely. Areas too wet to cultivate can be used by sowing Bermuda grass and Japan clover for hay and pasturage.

This type usually is held in conjunction with other soils of the uplands, and has a higher selling value. Owing to its high productiveness the reclamation of much of this land would prove profitable. The main stream channels can be straightened and lateral ditches constructed to allow more complete and rapid removal of surface water. Such improvement and the diking of cultivated areas have been successfully employed in the reclaiming of similar soils in other parts of the country. The type is well suited to the production of the staple crops of the region, and in addition forage grasses do particularly well, so that stock raising probably could be made an important industry in conjunction with general farming on the associated upland types.

BIBB SILT LOAM.

The surface soil of the Bibb silt loam typically consists of a mottled gray and yellow silt loam, 6 to 8 inches deep. The subsoil is a gray to brownish-gray silt loam, very compact in the lower part. Yellowish and brownish iron stains give the subsoil a mottled appearance.

The type is extremely variable in texture. In some areas the surface soil is a very fine sandy loam, grading into gray silty material at about 12 inches, and this in turn into gray or mottled gray and yellow silty clay loam. Such areas represent the Bibb very fine sandy loam, which can not be mapped separately on account of their small extent. In other places the subsoil consists of a drab plastic clay. There are also included slight ridges or elevations in which the surface soil is brownish and the subsoil yellowish or mottled gray and yellow. The more uniformly yellowish color of the subsoil material in these areas is due to better drainage and consequent more thorough oxidation.

The Bibb silt loam is not extensive. It occurs along Hudgins Creek in the northwestern part of the county, and along Saline River in the southwestern part. Small areas lying along several upland

streams are included with the Ochlockonee silt loam. The type is alluvial in origin. The surface is flat except where relieved by slight ridges, and drainage is very deficient.

This soil is not cultivated, the greater part of the type being occupied by a heavy forest growth, including white, water, and overcup oak, gum, hickory, elm, and holly.

Where cleared the type produces a good growth of wild grasses and much of it could profitably be cleared and used for grazing. Practically all the type is subject to excessive overflow, and can not be cultivated without levee protection. Where reclaimed and protected from overflow the usual staple crops can be grown successfully. The areas along Hudgins Creek are less frequently inundated than those along Saline River, and consequently are more desirable for grazing. Rice is successfully grown on this soil type in other States. Under present conditions it is valuable only for its grass and timber.

PORTLAND VERY FINE SANDY LOAM.

The Portland very fine sandy loam is a light-brown to grayish-brown very fine sandy loam, grading through lighter colored, in some places pinkish, very fine sandy loam into brownish-red or salmon-colored, moderately friable to plastic silty clay, which lies at depths ranging from 18 to 25 inches. In the higher areas the subsoil is somewhat redder and the surface soil is frequently deeper than typical, often continuing to a depth of 30 inches. In places where the surface is billowy the soil varies from a very fine sandy loam on the tops of the ridges to a silt loam or silty clay loam in the depressions, such variations frequently occurring within a distance of a few feet.

Several minor variations occur. In poorly drained situations the soil is grayish to a depth of 10 to 12 inches, and the subsoil, which to 30 inches is a silty clay loam in texture, is mottled grayish, yellowish, and reddish brown in color. Below 30 inches the material changes to pinkish or salmon-colored silty clay. In other places the subsoil below about 24 inches is a pinkish silty clay mottled with yellow and drab. In the vicinity of Tillar near Dowells Brake the soil, to a depth of 6 inches, is distinctly brown, and grades into more silty material of gray, mottled with brown and yellow color, resting at about 15 inches on a pinkish, heavy clay, faintly mottled with gray. The gray color is most pronounced in low-lying areas and in the zone of contact with the heavy Portland types. There are also included in the type small areas, 1 to 2 acres in extent, of silt to silty clay loam, these being too small to separate on the map. In places the texture is a very fine sand to loamy very fine sand to a depth of 22 to 25 inches.

The Portland very fine sandy loam occurs in the eastern part of the county in the first bottoms of Bayou Bartholomew, where it is the predominant type. It occupies large isolated areas from $\frac{1}{2}$ mile to 2 miles wide bordering the stream. It is protected from the overflow waters of the Mississippi River by levees. The soil consists of alluvial material derived in large part from the soils of the Permian Red Beds region, transported by the Arkansas River and Bayou Bartholomew. Some of the material is washed from the surrounding upland soils, but it is the Red Beds material that gives the subsoil its distinctive reddish color.

The topography is flat except where broken by old stream channels or slight ridges. The type usually lies 2 to 4 feet above the level of the Portland clay, but there is no sharp break in topography between the types. The drainage of the higher lying areas is adequate, while that of the lower, depressed situations is more or less deficient. In places the type is much dissected by sloughs, "cut-offs," and lakes.

Agriculturally, the Portland very fine sandy loam is one of the most important soils in the county. About 90 per cent is in cultivation, and the remainder has been cleared. The original forest growth consisted of overcup, white, black, and laurel oak, hickory, gum, elm, pecan, holly, and cypress. This was one of the first types in the county to be cleared. It is easily cultivated, can be tilled under a wide range of moisture conditions, and is very productive.

Cotton and corn are the most important crops, cotton occupying about 75 per cent of the cultivated area. The Wanamaker Cleveland, Express, and Triumph are the principal varieties. Cotton frequently yields from three-fourths bale to $1\frac{1}{4}$ bales per acre. In recent years, however, the boll weevil has caused considerable damage, and in some seasons the cotton crop has been a failure.

Many farmers use fertilizer on this soil. When potash could be obtained an application of 200 to 250 pounds per acre of a mixture containing 10 per cent phosphoric acid, 2 per cent nitrogen, and 2 per cent potash was commonly applied. The fertilizer used at present consists largely of mixtures of various carriers of nitrogen and phosphoric acid. Cottonseed meal frequently is used either alone or with acid phosphate.

In preparing the seed bed for cotton the usual methods—bedding the land with 1-horse plows—is employed, 18 to 20 acres commonly being allotted to each plow. The yield of cotton is good under normal conditions. Corn is grown as feed for work stock. The yield rarely exceeds 30 to 35 bushels per acre, and the average is much lower. On well-managed farms, however, yields of 50 to 55 bushels have been reported. The seed bed for corn is generally prepared like that for cotton. Fall plowing is not extensively practiced.

Corn and cotton have been grown continuously on much of this land for the last 35 years, or since it was first cleared. Apparently the yields are decreasing, indicating the need of a better system of farming, including deeper plowing and the introduction of rotations to include such crops as lespedeza, cowpeas, beans, and vetch. The soil is well suited to all these crops.

The advent of the boll weevil has directed the attention of some farmers to a diversification of crops. Lespedeza is becoming popular as a hay crop. It is cut twice and occasionally three times a season; giving a total yield of 2 to 3 tons of hay per acre. Lespedeza grows wild and can be made the basis of a profitable crop rotation. Alsike clover is well suited to this soil. Red clover also is grown successfully on this type.

There are several small fields of alfalfa on the type. This crop can be grown successfully in the well-drained areas. One of the main difficulties in growing alfalfa in this section is the control of weeds and grass while the crop is becoming established. It is therefore important to select land that has been in clean cultivation. Inoculation is necessary, and liming beneficial.

Much of the Portland very fine sandy loam is included in plantations containing from 500 to 2,000 acres. These are farmed mainly by negro tenants, usually on shares. Some of the land is rented for cash, the ordinary rate being about \$5 an acre. On several of the larger plantations white managers are hired, who supervise more or less closely the work of the tenants. The tenant system is not favorable to the practice of diversified farming or to the extension of the live-stock industry. The leases are usually for one year, and the tenant has no interest in the land except to crop it as heavily as possible to cotton during his term of occupation. Although a few cows and pigs are kept by most of the tenants these are raised on the open range and given little care. Some farmers raise hogs on the mast and graze cattle on the cane and wild grasses of the bottoms.

On many farms, including the tenancies, small fields of sorghum are grown for making sirup. A yield of 200 to 400 gallons per acre is obtained. The sirup is of good quality. The sandy nature of the soil makes it well adapted also to Irish and sweet potatoes, peanuts, and garden vegetables, and such crops are grown for local use, but not commercially. With the existing facilities for marketing, it would seem good opportunities for commercial truck growing existed. Ordinarily Irish potatoes yield about 100 bushels per acre. In July the potato land can be replanted to sweet potatoes, corn, or cowpeas, or to another crop of Irish potatoes.

Land of this type is valued at \$35 to \$60 an acre, the price depending mainly on the location and character of improvements.

In the permanent improvement of this soil the most essential step is to increase the supply of organic matter. Under existing conditions the best way to accomplish this is to turn under green manuring crops.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of the Portland very fine sandy loam:

Mechanical analyses of Portland very fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
461523.....	Soil.....	0.0	0.0	0.0	4.0	47.1	42.5	6.4
461524.....	Subsoil.....	.0	.0	.1	11.0	46.9	28.6	13.3

PORTLAND SILTY CLAY LOAM.

The Portland silty clay loam consists of a surface soil of a brownish silty clay loam 6 or 8 inches deep, a subsurface layer of lighter brown or mottled grayish, yellowish, and brownish silty clay 15 inches thick, and a subsoil of dull-red or brownish-red, plastic silty clay or clay, in places somewhat mottled with drab below about 20 inches. In some areas the upper subsoil is yellowish to mottled yellowish and grayish or salmon colored, the deeper red appearing in the lower part of the 3-foot section. This soil is locally spoken of as "black buckshot land."

The type includes several variations. There are places where the surface soil is a heavy silty clay loam with a distinct reddish to reddish-brown cast, grading quickly into a reddish to pinkish-red clay which either continues without important change throughout the remainder of the 3-foot section or shows gray, drab, and yellowish mottling in the lower 6 inches. Such areas are locally spoken of as "red buckshot land," and are not so highly esteemed as the typical soil, or "black buckshot land." In texture the soil varies from a heavy silt in marginal areas along the Portland very fine sandy loam to a silty clay in areas adjoining the Portland clay.

The Portland silty clay loam occurs in the bottoms of Bayou Bartholomew in the eastern part of the county. Prevaingly it lies slightly lower than the Portland very fine sandy loam, and in many places represents gradational areas between the very fine sandy loam on the one hand and the clay on the other. The surface is flat, and drainage is generally deficient. There are included low, depressed areas in which the drainage is poor. Although nearly all the type is sufficiently well drained for profitable crop production, yields can generally be improved by ditching or tiling.

About 40 per cent of this type is in cultivation and the soil is regarded as very productive. Areas not in cultivation are forested, chiefly with white, overcup, black, water, and pin oak, hickory, and elm. Cotton and corn are the principal crops. The type is better adapted to corn than to cotton, whose yields compare very favorably with those obtained on the very fine sandy loam type. Ridge cultivation is generally practiced, and is advisable in the areas of deficient drainage. The soil has a tendency to bake and crust, and for this reason it is sometimes plowed when very wet. In subsequent drying the clods break into small aggregates, so that a fair seed bed can be prepared.

Areas of this type are owned in connection with other soils. In general it is less desirable for farming than the Portland very fine sandy loam.

In order to improve the physical properties of the soil and prevent as far as possible the formation of a crust, organic matter should be incorporated. Under existing conditions this can be most economically done by plowing under green crops. When adequately drained the type will produce alfalfa and alsike. Lespedeza and bur clover are also valuable crops for building up the soil. Where these legumes can not be grown such annuals as cowpeas and soy beans can be used in the rotation, and the soil benefited by turning under the stubble.

Portland silty clay loam, poorly drained phase.—Small areas of a poorly drained phase of the Portland silty clay loam are mapped, in which the soil is a gray to grayish-brown silty clay loam, passing at an average depth of about 6 inches into light-gray or bluish-gray, rather plastic silty clay, frequently mottled with yellow or reddish yellow, extending to 20 or 30 inches. Below this layer the material changes to a dull Indian red to salmon-colored, plastic silty clay, faintly mottled in places with dark bluish, yellowish, or grayish colors. The phase occupies lower and less well drained situations than the typical Portland silty clay loam.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of the typical Portland silty clay loam:

Mechanical analyses of Portland silty clay loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
461525.....	Soil.....	0.1	1.0	0.6	3.0	9.2	63.4	22.2
461526.....	Subsoil.....	.0	.2	.2	4.1	22.9	41.0	31.4

PORTLAND CLAY.

The Portland clay is variable in physical characteristics. Typically the soil consists of brown to grayish-brown silty clay about 3 inches deep, underlain by mottled gray, yellowish, and reddish-brown silty clay, extending to a depth of about 20 inches. The subsoil is a mottled salmon-brown and bluish-gray clay, underlain at about 30 inches by salmon-colored to pinkish or dull-red silty clay which extends to depths of 40 inches or more. In places the subsoil has a chocolate-red color, much like the subsoil of the Miller clay as encountered in Jefferson County. In some areas a mottled drab, yellow, and pink clay is encountered at about 18 inches.

In the better-drained areas the soil is a brown silty clay to a depth of about 12 inches, grading into dull-reddish silty clay, mottled faintly with drab and yellow. In the lower situations the surface soil is prevailingly grayish, grading quickly into mottled gray, yellowish, and rusty-brown silty clay, the mottling becoming more marked with increase in depth. The type includes occasional small areas of a bluish to ashy clay underlain at about 15 inches by mottled gray, yellow, and drab clay. The lower subsoil usually is a dull-red to pinkish clay. These areas occur as small, inundated depressions irregularly distributed throughout the main body of the type. In texture the type varies locally from a heavy, plastic clay to a moderately friable silty clay.

The Portland clay is mapped in large areas in the eastern part of the county in the bottoms of Bayou Bartholomew. The soil is alluvial, and contains a fair percentage of organic matter. The subsoil contains enough material brought down by the bayou and Arkansas River from the Permian Red Beds to give it a distinctly reddish cast. There is also present considerable wash from the soils of the surrounding upland. The type has a nearly level or basin-shaped surface configuration which, together with its low-lying position and plastic structure, gives it poor drainage. The drainage varies considerably, however, in different places. Areas along Cutoff Creek north of Collins and about 6 miles south of Collins at the junction of Cutoff and Wolf Creeks are subject to frequent and excessive overflow. That part of the type lying between Cutoff Creek and the bayou, southeast of Collins, is not so frequently overflowed, but has poor drainage. In most cases adequate drainage can be provided by ditching.

At present the type is valued principally for its timber. It supports a heavy growth of pin, white, overcup, black, and willow oak, cypress, pecan, ash, elm, and gum. There is in places a heavy growth of cane, which makes good pasturage. Only a few small areas of the type in the vicinity of Tillar and Winchester are in cultivation.

The soil is regarded as better suited to cotton than to corn. Acreage yields of 30 to 35 bushels of corn and 1 to 1½ bales of cotton are reported. Crops do best in dry seasons on account of the inadequate drainage.

This soil is more difficult to work than the Portland very fine sandy loam. About 14 acres per plow is cultivated. The type makes valuable pasture for cattle and hogs.

The selling price of land of the Portland clay type depends primarily upon the stand of timber. Areas in virgin forest range in value from \$30 to \$35 an acre. Most of the cut-over land sells for \$15 or less, difference in price depending mainly on location.

The productiveness of this soil is gaining recognition. Drainage is its first requirement, and most of the type can be adequately drained by ditching. Bayou Bartholomew affords a good outlet for the surface water. This stream has cut its channel many feet below the surface level and there is thus sufficient fall for the ditches.

Portland clay, poorly drained phase.—The Portland clay, poorly drained phase, occupies depressions most of which represent partially filled abandoned channels of streams. The soil is kept permanently wet in most of these situations owing to the fact that there are inadequate outlets for drainage. In places the immediate surface soil dries out in long dry seasons. The soil shows less red within the 3-foot section than the typical Portland, frequently no red appearing above depths of about 30 to 40 inches. Much of it is bluish-gray from near the surface down through the 3-foot section. Probably land of this kind would prove very productive if properly drained. There is a good deal of cypress and tupelo on this phase.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of the typical Portland clay:

Mechanical analyses of Portland clay.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
461527.....	Soil.....	0.5	2.5	1.8	5.2	2.4	40.3	47.2
461528.....	Subsoil.....	.2	1.4	.8	2.1	1.2	31.4	62.8

SUMMARY.

Drew County, Arkansas, lies in the southeastern part of the State. It has an area of 847 square miles, or 542,080 acres. The western part of the county is crossed by a north-south belt of rolling upland 6 to 12 miles wide. East of this belt is a broad flat area known as the flatwoods upland, bordered on the east by the extensive bottoms of Bayou Bartholomew. The rolling upland is generally well to

excessively drained, the flatwoods have inadequate drainage, and the bottom lands are poorly drained and subject to overflow. With the exception of a few prairie areas, the county originally was forested, chiefly with hardwoods, with some pine in the southwestern part. About 35 per cent of the rolling uplands, 15 per cent of the flatwoods upland, and 60 per cent of the bottom land is now in cultivation.

The population of Drew County is reported in the 1910 census as 21,960, all of which is classed as rural. About one-half the population consists of negroes. Monticello is the county seat, with a population estimated at about 4,000.

Shipping facilities are fairly good. A few wagon roads out of Monticello are well graded for distances of several miles. Most of the other roads are very poor, as little attention is given to road improvement. Most of the rural sections are supplied with telephone service and rural mail delivery.

The climate is typical of the central part of the Gulf Coastal Plain, being free from great extremes of temperature and favorable to the production of a wide variety of crops and to stock raising. The mean annual temperature is about 63° F., and the mean annual precipitation about 52 inches. There is an average growing season of 217 days.

Agriculture is the chief industry, although lumbering is still important. Cotton has always been the main money crop. Corn grown for home use ranks second in acreage. Other crops are of relatively little importance. Some hay is produced, and oats are grown to a small extent. Increasing attention is being given to diversified farming, including the production of legume crops. The live-stock industry, which has never been very important, is developing. The boll weevil has damaged the cotton crop considerably in recent years, and agricultural conditions have been somewhat unsettled.

The 1910 census reports a total of 3,515 farms, each tenancy being classed as a farm. About 56 per cent of the area of the county is reported in farms, the average size of which is given as 86.2 acres. Of the land in farms, 42.4 per cent, or 36.6 acres per farm, is reported improved. About 42 per cent of the farms are reported operated by owners, and practically all the remainder by tenants.

Sixteen distinct soil types, representing nine soil series, are mapped in Drew County. The rolling upland comprises the Orangeburg fine sandy loam, the Ruston fine sandy loam, Ruston very fine sandy loam, small areas of the Ruston silt loam, the Susquehanna silt loam, Susquehanna very fine sandy loam, Susquehanna gravelly sandy loam, the Crowley silt loam, and some areas of the Caddo very fine sandy loam.

The Orangeburg and Ruston soils are well suited to truck crops and certain orchard fruits, as well as to the general farm crops. The Susquehanna soils are best adapted to the production of forage crops, and are well suited to stock raising. The Crowley silt loam occurs in the southern part of the county. It is the typical prairie soil of this section and is well suited to the staple crops of the region, including oats and wheat.

The flatwoods comprise large areas of the Caddo silt loam, and the Lufkin silt loam, and areas of the Ruston silt loam. Although cotton and corn are successfully grown on the Caddo silt loam, its best use is for forage crops and stock raising. This soil is also well adapted to rice production, for which it is extensively used in other parts of the State and in Louisiana. The Lufkin silt loam is not cultivated, on account of its poor drainage. It is successfully used for rice in other sections. The Ruston silt loam is extensively used for the production of the staple crops, including corn, cotton, oats, and fruit, for which it is well suited.

The bottom soils are the Portland very fine sandy loam, silty clay loam, and clay; the Ochlockonee silt loam; and the Bibb silt loam.

The Portland very fine sandy loam and the Ochlockonee silt loam constitute good agricultural land. They are very productive, and with proper farming methods are easily kept in good condition. The heavier Portland soils and the Bibb silt loam are imperfectly drained.

In general, the soils of Drew County are deficient in organic matter, as a result of continuous cropping to cotton and corn. This condition can be remedied by adding manure, by introducing crop rotations to include the legumes, and by green manuring.



[PUBLIC RESOLUTION—No. 9.]

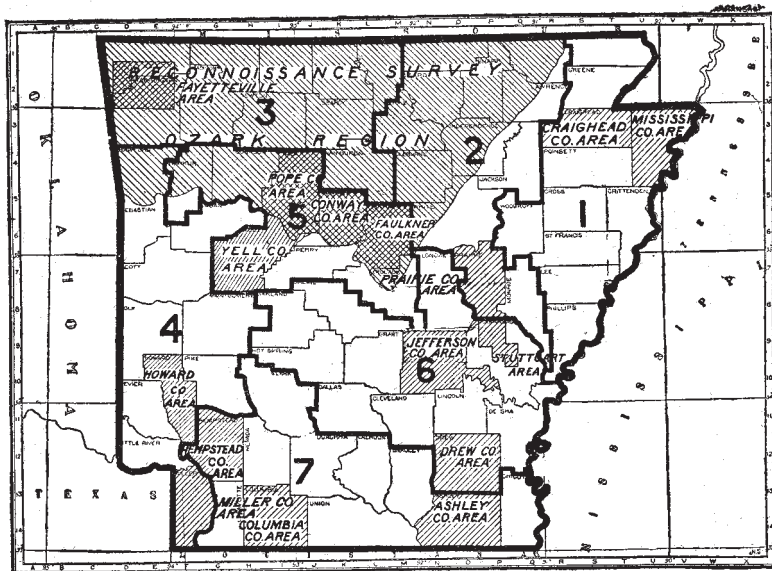
JOINT RESOLUTION Amending public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, "providing for the printing annually of the report on field operations of the Division of Soils, Department of Agriculture.

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, be amended by striking out all after the resolving clause and inserting in lieu thereof the following:

That there shall be printed ten thousand five hundred copies of the report on field operations of the Division of Soils, Department of Agriculture, of which one thousand five hundred copies shall be for the use of the Senate, three thousand copies for the use of the House of Representatives, and six thousand copies for the use of the Department of Agriculture: *Provided*, That in addition to the number of copies above provided for there shall be printed, as soon as the manuscript can be prepared, with the necessary maps and illustrations to accompany it, a report on each area surveyed, in the form of advance sheets, bound in paper covers, of which five hundred copies shall be for the use of each Senator from the State, two thousand copies for the use of each Representative for the congressional district or districts in which the survey is made, and one thousand copies for the use of the Department of Agriculture.

Approved, March 14, 1904.

[On July 1, 1901, the Division of Soils was reorganized as the Bureau of Soils.]



Areas surveyed in Arkansas.

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